CLAIMS

What is claimed is:

1. A method for inline testing a plurality of light-emitting panels, comprising the steps of:

manufacturing the plurality of light-emitting panels in a web fabrication process, the web fabrication process comprising a plurality of process steps and a plurality of component parts, wherein the plurality of process steps are performed a plurality of times to manufacture the plurality of light-emitting panels;

testing a portion of one or more light-emitting panels after at least one process step of the plurality of process steps is performed at least one time;

processing data from the testing to produce at least one result;

analyzing the at least one result to determine whether the at least one result is within a specific target range; and

adjusting the at least one process step or at least one component part of the plurality of component parts if the at least one result is not within the specific target range.

2. The method of claim 1, wherein the plurality of process steps comprise:

a micro-component forming process;

a socket formation process;

an electrode placement process;

a micro-component placement process;

an alignment process; and

a panel dicing process.

3. The method of claim 2, wherein testing the portion of one or more light-emitting panels after the micro-component forming process comprises testing at least one characteristic of at least one micro-component, wherein the at least one characteristic is selected from a group consisting of size, shape, impedance, gas composition and pressure, and shell thickness.

4. The method of claim 2, wherein testing the portion of one or more light-emitting panels after the electrode placement process comprises testing at least one characteristic of at least one electrode, wherein the at least one characteristic is selected from a group consisting of placement, impedance, size, shape, material properties and electrical component functionality.

5. The method of claim 2, wherein testing the portion of one or more light-emitting panels after the micro-component placement process comprises testing at least one characteristic of at least one micro-component, wherein the at least one characteristic is selected from a group consisting of position and orientation.

6. The method of claim 5, wherein the one or more light-emitting panels is one or more color light-emitting panels and wherein the at least one characteristic is selected from a group consisting of position, orientation, and proper color micro-component for proper socket.

7. The method of claim 2, wherein testing the portion of one or more light-emitting panels after the alignment process comprises testing at least one characteristic of a second substrate, wherein the at least one characteristic is selected from a group consisting of position and orientation.

8. The method of claim 2, wherein testing the portion of one or more light-emitting panels after the dicing process comprises testing at least one characteristic of the light-emitting panel, wherein the at least one characteristic is selected from a group consisting of size, shape, and luminosity.

9. The method of claim 2, wherein the micro-component forming process comprises a micro-component coating process.

10. The method of claim 9, wherein testing the portion of one or more light-emitting panels after the micro-component coating process comprises testing whether at least one coating

on at least one micro-component was properly applied or whether the at least one coating on the at least one micro-component provides its intended functionality.

11. The method of claim 2, wherein the socket formation process comprises:
an electrode and enhancement material placement process; and
a patterning process.

12. The method of claim 11, wherein testing the portion of one or more light-emitting panels after the electrode and enhancement material placement process comprises testing at least one characteristic of at least one electrode or at least one enhancement material, wherein the at least one characteristic is selected from a group consisting of placement, impedance, size, shape, material properties and enhancement material functionality.

13. The method of claim 11, wherein testing the portion of one or more light-emitting panels after the patterning process comprises testing at least one characteristic of at least one cavity, wherein the at least one characteristic is selected from a group consisting of placement, impedance, size, shape, depth, wall quality and edge quality.

14. The method of claim 2, wherein the socket formation process comprises:
an electrode and enhancement material placement process;
a material layer placement process; and
a material layer removal process.

15. The method of claim 14, wherein testing the portion of one or more light-emitting panels after the electrode and enhancement material placement process comprises testing at least one characteristic of at least one electrode or at least one enhancement material, wherein the at least one characteristic is selected from a group consisting of placement, impedance, size, shape, material properties and enhancement material functionality.

16. The method of claim 15, wherein testing the portion of one or more light-emitting panels after the material layer placement process comprises testing at least one characteristic of at least one material layer of a plurality of material layers, wherein the at least one characteristic is selected from a group consisting of size, shape, thickness and material properties.

17. The method of claim 16, wherein testing the portion of one or more light-emitting panels after the material layer removal process comprises testing at least one characteristic of a cavity formed in the plurality of material layers as a result of the material layer removal process, wherein the at least one characteristic is selected from a group consisting of size, shape, depth, wall quality and edge quality.

18. The method of claim 2, wherein the socket formation process comprises:
an electrode and enhancement material printing process;
a patterning process; and
a material layer placement and conforming process.

19. The method of claim 18, wherein testing the portion of one or more light-emitting panels after the electrode and enhancement material placement process comprises testing at least one characteristic of at least one electrode or at least one enhancement material, wherein the at least one characteristic is selected from a group consisting of placement, impedance, size, shape, material properties and enhancement material functionality.

20. The method of claim 19, wherein testing the portion of one or more light-emitting panels after the patterning process comprises testing at least one characteristic of at least one cavity, wherein the at least one characteristic is selected from a group consisting of placement, impedance, size, shape, depth, wall quality and edge quality.

21. The method of claim 20, wherein testing the portion of one or more light-emitting panels after the material layer placement and conforming process comprises testing at least one characteristic of at least one material layer of a plurality of material layers, wherein the at least

one characteristic is selected from a group consisting of size, shape, thickness and material properties.

22. The method of claim 1, wherein the step of testing the portion of one or more light-emitting panels, comprises the step of testing more than one light emitting panel, wherein the step of processing data, comprises the step of storing the at least one result after each time a light-emitting panel is tested to produce a plurality of stored results, wherein the step of analyzing the at least one result, comprises the step of analyzing the plurality of stored results to determine whether there is consistent nonconformity, and wherein the step of adjusting the at least one process step or the at least one component part, comprises the step of adjusting the at least one process step or the at least one component part if there is consistent nonconformity.

23. A method for forming a light-emitting panel, comprising the steps of:

providing a first substrate;

forming a plurality of cavities on or within the first substrate;

placing at least one micro-component in each cavity;

providing a second substrate opposed to the first substrate such that the at least one micro-component is sandwiched between the first substrate and the second substrate;

disposing at least two electrodes so that voltage supplied to the at least two electrodes causes one or more micro-components to emit radiation; and

inline testing at least one of the first substrate, at least one cavity of the plurality of cavities, the at least one micro-component, at least one electrode of the at least two electrodes, and the second substrate.

24. The method of claim 23, further comprising the steps of:

processing data from the inline testing to produce at least one result; and

utilizing the at least one result to adjust at least one of the first substrate, the formation of the plurality of cavities, the plurality of cavities, the placement of the at least one micro-component, the at least one micro-component, the disposition of at least one of the at least two

electrodes, one or more electrodes, the placement of the second substrate and the second substrate.

25. The method of claim 24, wherein the step of forming a plurality of cavities on or within the first substrate, comprises the step of patterning a plurality of cavities in the first substrate.

26. The method of claim 24, wherein the first substrate comprises a plurality of material layers and wherein the step of forming a plurality of cavities on or within the first substrate, comprises the step of selectively removing a plurality of portions of the plurality of material layers.

27. The method of claim 24, wherein the step of forming a plurality of cavities on or within the first substrate, comprises the steps of:

patterning a plurality of cavities in the first substrate; and

disposing a plurality of material layers on the first substrate so that the plurality of material layers conform to the shape of the cavities.

28. The method of claim 2, wherein the socket formation process comprises:

an electrode and enhancement material printing process; and

a material layer placement and alignment process.

29. The method of claim 28, wherein testing the portion of one or more light-emitting panels after the electrode and enhancement material placement process comprises testing at least one characteristic of at least one electrode or at least one enhancement material, wherein the at least one characteristic is selected from a group consisting of placement, impedance, size, shape, material properties and enhancement material functionality.

30. The method of claim 29, wherein testing the portion of one or more light-emitting panels after the material layer placement and alignment process comprises testing at least one

characteristic of at least one material layer of a plurality of material layers, wherein the at least one characteristic is selected from a group consisting of size, shape, thickness, alignment and material properties.